UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF COMMERCIAL FISHERIES

CALIFORNIA FISHERY MARKET NEWS MONTHLY SUMMARY

MAY 1968

PART II–Fishing Information*

Sea-surface temperatures, fishing and research information of interest to the West Coast tuna-fishing industry and marine scientists

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U. S. Department of the Interior
Bureau of Commercial Fisheries
Fishery-Oceanography Center
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La Jolla, California 92037

*Part 1 - "Fishery Products Production and Market Data" is issued by the Bureau of Commercial Fisheries, Market News Service, U. S. Custom House, Terminal Island, California

TEMPERATE TUNA FORECAST FOR 1968

The statements which follow constitute the eighth consecutive annual prediction to be issued for the summer season albacore and bluefin tuna fisheries off the Pacific Coast.

The merger of the former California Current Resources Laboratory and the Tuna Resources Laboratory to form the Fishery-Oceanography Center (see August, 1967, issue of this publication) has placed the former Tuna Forecasting Program as a project within a new Fishery-Oceanography Program. Although the mandate of the new program is broader than previously, our staff has yet to realize significant gains to date in either personnel or funds because of restrictions presently affecting Federal activities. Nevertheless, advances during the past year were made in the areas of environmental monitoring and prediction; these advances were in heat budget studies, the analysis of sea temperature anomalies, and in the interpretation and application of the wealth of data made available to us through the cooperative data exchange program between the Fishery-Oceanography Center and the Naval Weather Service's Fleet Numerical Weather Central at Monterey, California.

Satisfactory measurement of biological aspects of the temperate tuna populations and the effects of varying economic conditions has continued to lag far behind our progress in monitoring and understanding the environment. No meaningful progress has been made on the estimation of year-class strength, apparent fish abundance, and fishing effort for either albacore or bluefin tuna.

Early subscribers to this publication should note that these 1968 forecast statements are being made about 3-4 weeks later than in previous years. The delay in issuance of our predictions arises from experience accumulated during the past 8 years, which has shown that prediction techniques once thought to be valid have not withstood the test of time satisfactorily. Our prediction techniques were based upon the expected persistence of large-scale sea surface temperature anomaly patterns; consequently, the offshore thermal trends observed in April of each year were assumed to persist at least through the following month of July. Last year, this assumption failed: the abnormally cold conditions observed in April, 1967, were the basis for our predicting a late, more southern fishery than in 1966. Subsequently, intense early-summer warming completely overtook the previous cooling trend, and by July 15, abnormally warm conditions were established in the Pacific Northwest and then persisted for the remainder of the season. The albacore responded rapidly to these dynamic changes, producing near-record catches off Oregon and Washington while California experienced very poor fishing.

This experience dictates that we substantially alter our approach for the 1968 season. One major change will be the temporary suspension of long-term quantitative landings and area forecasts. The second major change will be to make heavier use of short-term projections of conditions based on current information issued in the form of outlooks and occasional bulletins. These bulletins which received highly favorable response last year, will include: changes in oceanographic and atmospheric trends; changes in location of productive fishing areas; changes in total fishing effort; and other data that are pertinent to the fishing community. As in previous years, the success of these operations necessarily depends upon the input of first-hand information from the fishermen at sea, dock operators and processors. Our staff continues to be hampered by a scarcity ot timely information of this kind.

ALBACORE TUNA

Previous knowledge of the high correlation between catch and sea temperature, combined with an 8-year experience in observing and summarizing sea surface temperatures at 15-day intervals from April to October, provides us with the basis for depicting the shaded areas in Figure 1. The isotherm fields for the first and second halves of July represent our long-term averages for each interval. The shaded areas delineate the region where, on the basis of sea temperature averages, most of the albacore would be available in July. Since the prevailing weather and sea temperature patterns may deviate considerably from these averages during the period, we expect to have to modify and update our projections as conditions indicate; these will be forwarded to the fishing community as soon as practicable.

Preseason scouting activities will be minimal this year. The California Department of Fish and Game R/V N. B. Scofield is undergoing shipyard overhaul, and has been unable to embark on her usual May-June offshore scouting cruise. The loss of Scofield's valuable preseason participation has already resulted in substantial reduction of our ability to make early-season judgments based on data normally acquired during the cruise. The BCF R/V David Starr Jordan is presently at sea running the CalCOFI sardine-anchovy survey grid lines and is trolling for albacore in the nearshore region from Punta Eugenia, Baja California, northward to off Monterey Bay before returning to port on June 22. Jordan first reported taking four albacore near San Juan Seamount (33° N, 121° W) on June 12. This catch is the first authenticated report available this season, and suggests that the fish may be arriving on the Pacific Coast feeding grounds up to 2-3 weeks earlier than in the past 3 years.

The open ocean in the region encompassing the general migratory route of albacore (130-150° W) has shown large-scale warming trends in late May and early June. Thus, if the warming trend continues, we expect to see an appreciable

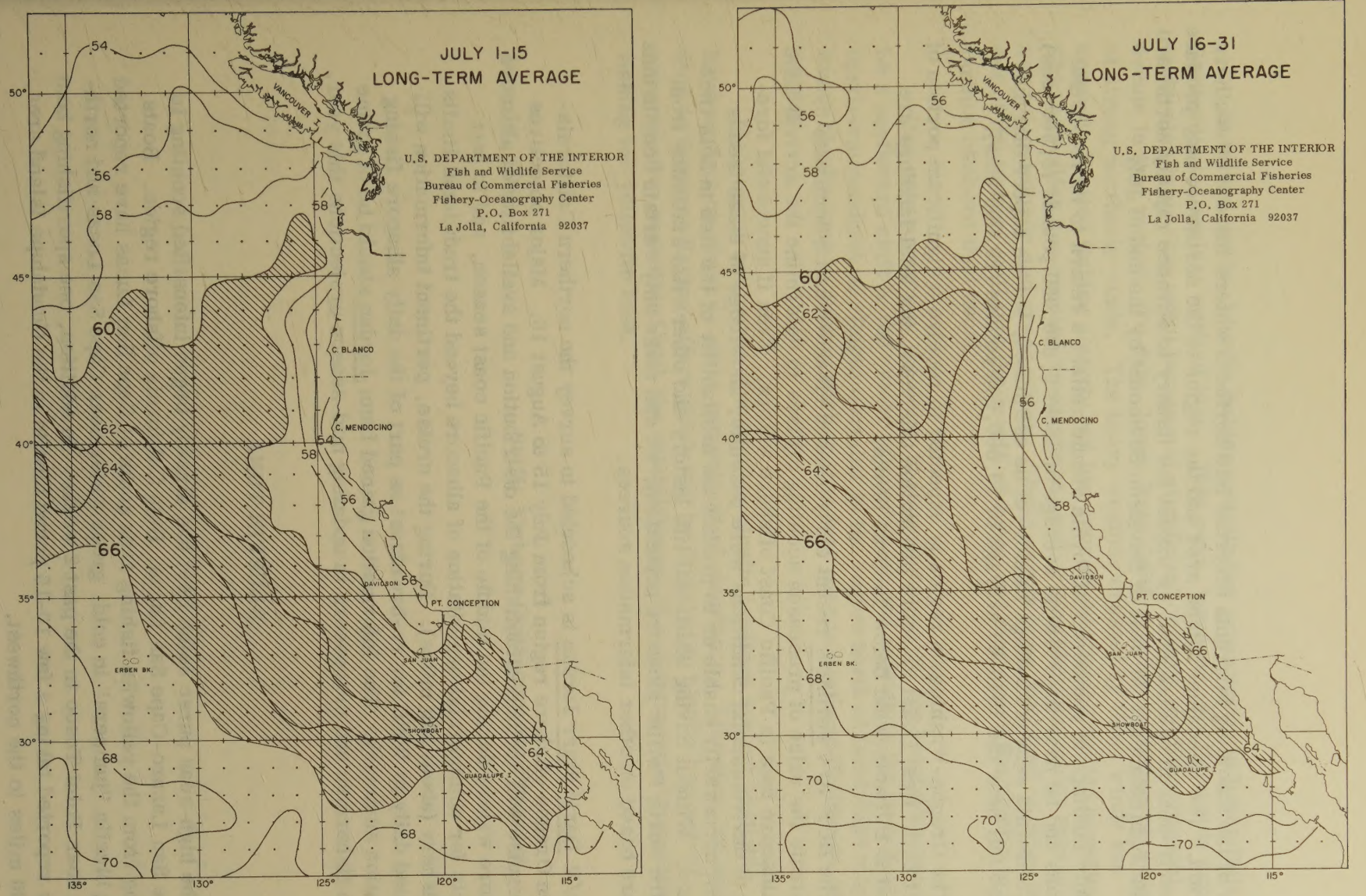


Figure 1.--Average sea surface temperature fields for the July 1-15 and 16-31 intervals. Shaded zone delineates region where most of the albacore would be available under these conditions.

portion of the incoming migrants diverted into northern waters instead of southern California. The Guadalupe Island area and the region to the northwest may produce some early-season catches, but we expect the fishery to advance rapidly northward from San Juan Seamount to west of Davidson Seamount by the end of July.

July landings in southern California should reflect a return to more normal conditions and be near the 1940-66 average of about 6,600,000 pounds (3,300 tons). Total California season landings cannot yet be estimated, but we expect that they may also fall near the 1940-66 average of 30,000,000 pounds (15,000 tons).

The Oregon-Washington region is expected to receive a significant portion of the total U.S. West Coast albacore production this year, but total landings are expected to fall somewhat below 1966-67 levels.

The BCF R/V Jordan's recent early-season albacore catch continues to demonstrate the value of preseason scouting cruises to determine the arrival time of the albacore tuna in Pacific Coast offshore waters. Even if successful forecasting of environmental conditions were possible, knowledge of these trends would not necessarily enable us to predict the availability of the fish in both time and space. Without having additional life history and other vital statistics from the entire North Pacific albacore population, we can make only certain conclusions which are based on other information sources.

R/V David Starr Jordan is scheduled to survey the northern California-southern Oregon offshore region from July 15 to August 16. Major objectives of this cruise will include establishing the distribution and availability of albacore in offshore waters during the middle of the Pacific coast season, and to test prospects for commercial exploitation of albacore beyond the traditional limits of the fishery (about 300 miles). During the cruise, pertinent information will be radioed daily to WWD for re-broadcast as part of the daily albacore fishing information summary. The information gained from Jordan should be of prime value to fishermen and processors in updating mid-season projections this year.

BLUEFIN TUNA

The high-seas purse seine fleet has already begun intensified scouting in the Cape San Lazaro-Cape San Lucas, Baja California offshore region. Boats returning from the yellowfin fishing area south of Cape San Lucas have reported sighting bluefin "jumpers" in cold, green water near Cape San Lucas and northward to near Point Tosco in the past 2 weeks. In addition, one sportfishing boat recently reported taking a few 10-15 pound bluefin in the Guadalupe Island area, about 400 miles to the northwest.

In recent years, bluefin fishing activity has commenced in lower Baja California by the last week of May. This year, however, the fishery is expected to develop later than usual because of significant changes in climatological events in that region. To date, lower Baja California has experienced a spate of strong northerly winds. The heavy weather created by these winds has severely limited fishing activity and has caused greatly-intensified upwelling. This upwelling has created a nearshore band of considerably colder than normal sea temperatures and green water. These events have combined to delay the onset of the fishery well into the month of June, and may cause the bluefin to remain farther offshore than usual.

One consequence ot the delay in commencement of the bluefin season will be a northward shift in the center of production and a delay in the period of maximum production. Rapid warming in the region north of Guadalupe may cause bluefin tuna to appear earlier than last year in southern California offshore waters.

Meaningful estimates of total 1968 bluefin landings are not available. We have no data on which to make projections of abundance. Likewise, we are unable to forecast fishing effort which will be diverted to bluefin because of uncertainties associated with the establishment of a closure date terminating fishing for yellowfin tuna.

June 13, 1968 Staff, Fishery-Oceanography Program

ALBACORE SEASON--1968 OPERATIONS

Radio Station WWD, licensed to the Bureau of Commercial Fisheries and located on the campus of the Scripps Institution of Oceanography, University of California at San Diego, will resume its broadcasts of albacore fishery information again this year. Double sideband voice broadcasts will emanate from WWD twice daily during weekdays only from June 17-October 31 on frequency 4415.8 kcs and 8805.6 kcs at 0500 PST (0600 PDST) and 1945 PST (2045 PDST). (Further curtailment of funds and personnel resources continues to prevent the development of an adequate broadcast updating system for weekends and holidays.) Broadcasts will include the latest albacore information obtained from research vessels, cooperating fishing vessels, unloading station operators, and will contain sea temperatures and other pertinent weather information believed useful to albacore fishermen.

In addition, at the end of each 15-day calendar period, the Fishery-Oceanography Center will encode and prepare for transmission (twice daily for two consecutive days) the 15-day sea surface isotherm charts which are routinely mailed to about 800 readers. Map coordinates for the 15-day chart analysis ending on a given date covering the region east of 130° W. longitude and 30°-50° N. latitude will be coded as part of the message.

Sample Broadcast

"Daily albacore fishery information October 2, 1967

Fishing information:

Oregon--Fishing terminated over weekend as prefrontal weather forced boats into port. Unloadings have slowed as two major processors quit buying.

California--Fishing terminated in Mendocino area as prefrontal weather rose on Sunday. Some light action Davidson Seamount and Point Arena expected to be weathered out next 24 hours. No action reported south of Morro Bay where few 15 pound fish reported yesterday.

Weather summary:

Low pressure system 02/1200Z 987 mb centered near 50 N 135 W expected to fill somewhat but remain nearly stationary next 24 hours. Frontal trough approaching northern California coast expected to move inland

near end of period. Cooling in California interior valleys has nearly terminated thermal trough inland. Vancouver Island to Cape Mendocino winds moderate to strong southwesterly then shifting to northerly after frontal passage. Cape Mendocino to Point Conception winds moderate southwesterly to northwesterly near end of period. Point Conception southward winds light to moderate northwesterly outside Channel Islands becoming westerly inside. Sea conditions northern regions rough becoming moderate in southern offshore areas.

Map coordinates for 15-day chart ending September 30, 1967 covering region east of 130 W and from 25-50 N latitude.

Message coded as follows:

First 3 numbers are latitude in degrees and tenths.
Last 4 numbers are longitude in degrees and tenths.

Message:

Position of 60 degree isotherm	Position of 66 degree isotherm
5101300	4181300
5051287	4001263
4841255	3941260
4771248	3831263
4681243	3721260
4571243	3691255
4531244	3681245
4461255	3601235
4401256	3551214
4331255	3501212
4111257	3431211
4031253	3391206
3801235	3421200
3731231	
3711226	

Outlook:

Fall cooling commencing Pacific northwest offshore region indicating onset southward movement 60 degree isotherm. Continuation intense low pressure system Gulf Alaska will accelerate heat loss from upper mixed layer in area north of 42nd parallel. Look for albacore to commence offshore migration as sea temperatures drop rapidly Oregon-Washington region. California waters may produce some late-season action if good weather continues Point Sur to Cape Mendocino area.

BCF FOC, La Jolla
(End of broadcast.)"

The above message, when decoded and plotted as in the example following this section, provides the fisherman at sea with a current analysis of the 60°-66° F temperature zone (from which more than two-thirds of the total Pacific coast albacore landings have been produced in recent years). In addition, a summary of the Fishery-Oceanography Center staff's best estimate of what is expected to happen in the succeeding 15-day period will be included as in the sample above.

To make the advisory broadcast fully effective, the Fishery-Oceanography Center requires timely information from all sources at sea and ashore. To provide a medium for communication of oceanographic and current fishing data, Radio Station WWD will operate on the following frequencies and scheduled times:

Voice only	Telegraph only
4,415.8 kcs	4,262 kcs
8,805.6 kcs	8,698 kcs
12,403.5 kcs	12,871 kcs
16,533.5 kcs	17,105 kcs
22,079.5 kcs	22,419 kcs

Hours of Operation: Unlimited as requested, normally 0400-0100 local time 7 days per week, including holidays.

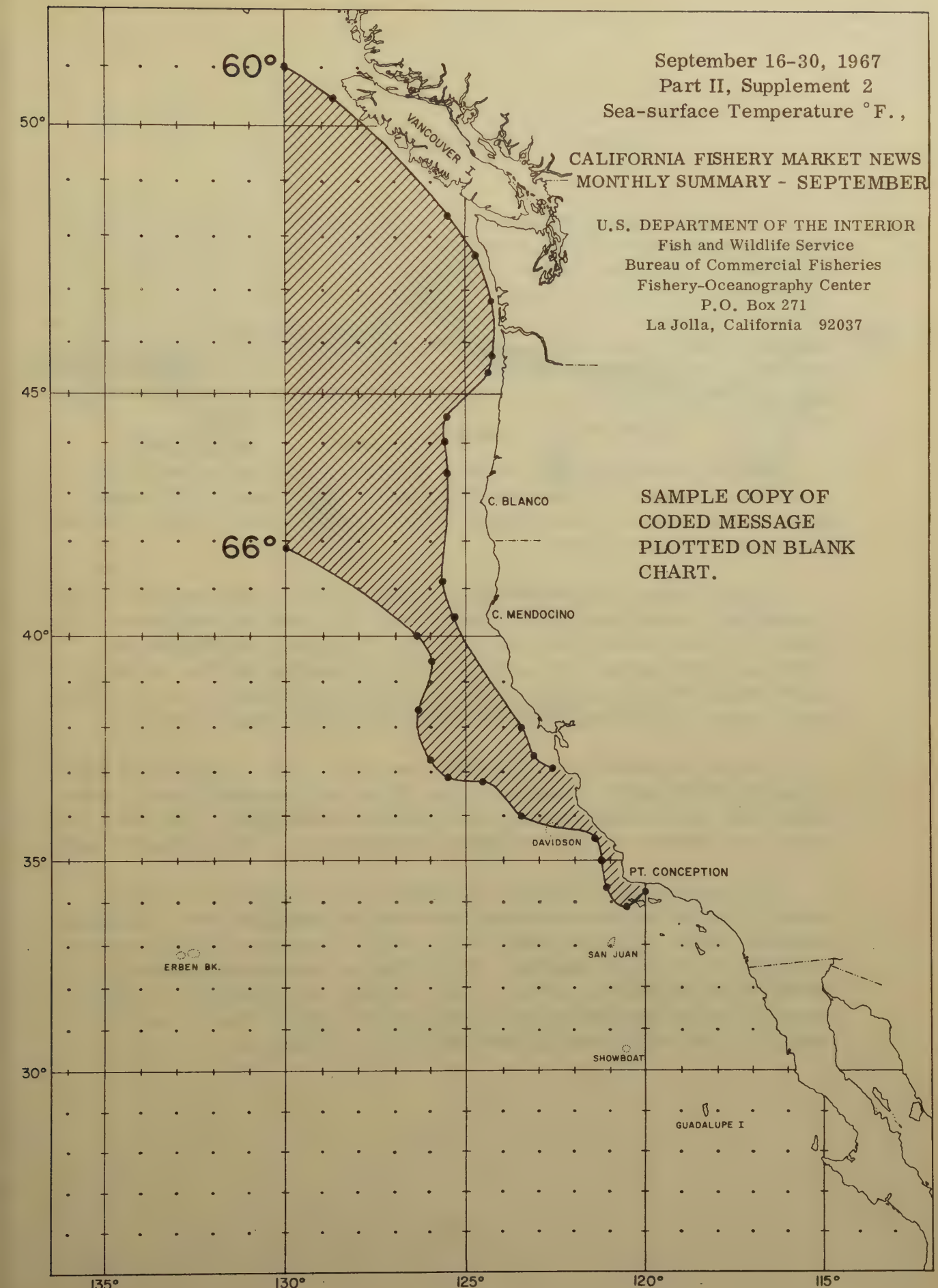
Class of Traffic: As approved by Radio Station WWD. Inter-ship operation, other than for relay of traffic and scientific exchange of data, is not authorized.

Boat operators interested in participating to provide information services directly to WWD are requested to write to

Director
Bureau of Commercial Fisheries
Fishery-Oceanography Center
P.O. Box 271
La Jolla, California 92037

for further details.

Staff, Fishery-Oceanography Program
June 13, 1968


September 16-30, 1967
Part II, Supplement 2
Sea-surface Temperature °F.,
CALIFORNIA FISHERY MARKET NEWS
MONTHLY SUMMARY - SEPTEMBER
U.S. DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Bureau of Commercial Fisheries
Fishery-Oceanography Center
P.O. Box 271
La Jolla, California 92037
SAMPLE COPY OF CODED MESSAGE PLOTTED ON BLANK CHART.
60°
66°
50°
45°
40°
35°
30°
135°
130°
125°
120°
115°
VANCOUVER I.
C. BLANCO
C. MENDOCINO
DAVIDSON
PT. CONCEPTION
SAN JUAN
SHOWBOAT
GUADALUPE I
ERBEN BK.

BASKING SHARK FISHERY NEEDS HELP

The long dormant California basking shark fishery was revived this year. BCF was instrumental in getting the fishery started, and is now studying migratory habits of the sharks to aid in fishing strategy. As before, the fishery is based on the liver oil of the sharks. The ultimate use of the oil is different, however. The liver oil contains a high percentage of "squalene," a hydrocarbon used extensively in cosmetics. Only a few species of sharks have significant amounts of squalene in their livers. The basking shark, being the largest of these, is being harvested in Norway and Japan, and now in California, for this purpose.

Basking sharks grow to a length of 30 feet or more, and adults weigh around 6,000 pounds; the liver of a 25-foot shark weighs about 1,000 pounds. The sharks are caught by harpooning, and are livered at sea. At present there is no market for the carcass.

Basking sharks are usually found close to shore, but this may merely be a reflection of where fishing boats are working. Not much is known about their movements, but it is suspected that they migrate annually between British Columbia and California. On the other hand it is possible that they move offshore during certain times of the year, or move to great depths. A theory has been proposed that basking sharks hibernate regularly in deep canyons.

When at the surface, basking sharks are easy to spot because their huge dorsal fins stick out like triangular sails. They cruise at about 2 knots, their mouths wide open, feeding on the minute plankton which makes up its diet. The sharks are a nuisance to salmon trollers and gillnetters in the northeast Pacific.

The albacore fleet, with its wide areal coverage and large number of vessels, is in a good position to help fishermen and biologists learn the sharks' migratory habits. Albacore fishermen can help by taking notes of the numbers of sharks seen and their localities. Information on basking shark sightings should be sent directly to Director, BCF, La Jolla, or to cannery officials or other fish dealers who will relay the information to BCF. The data will be logged, and the word passed immediately to shark fishermen.

The basking shark, Cetorhinus maximus.

SEA SURFACE TEMPERATURE CHARTS, EASTERN PACIFIC OCEAN
MAY 1968

Acknowledgements

The following organizations and stations contributed data for the May 1968 charts:

U.S. Bureau of Commercial Fisheries Exploratory Fishing and Gear Research Base, Seattle, Washington
U.S. Bureau of Commercial Fisheries Biological Laboratories La Jolla, California; Honolulu, Hawaii; and Seattle, Washington
U.S. Coast Guard Air Station, San Diego, California
U.S. Naval Communication Station Balboa, Fort Amador, Canal Zone
U.S. Naval Weather Service, Fleet Numerical Weather Central Monterey, California
Environmental Science Services Administration U.S. Weather Bureau, San Diego, California
Hopkins Marine Station, Pacific Grove, California, J. P. Balesteri
Instituto de Fomento Pesquero, Santiago, Chile, by Izadore Barrett
Inter-American Geodetic Survey by David Ortega at Manzanillo, Mexico; L. A. Peren at Pt. Armuelles, Panama; V. E. Castillo at Tumaco, Columbia; S. Valenzuela at La Libertad, Ecuador; LMS, EGS, MCHF, APM at Talara, Peru; Felise Falcon at San Juan, Peru; Arica, Antofagasta, Caldera, Valparaiso, and Talcahuano, Chile, through the courtesy of St. Hellmuth A. Sievers C. at the Instituto Hydrografico de la Armada, Valparaiso, Chile
Inter-American Tropical Tuna Commission, La Jolla and Terminal Island, California
Kelco Company, San Diego, California
Matson Navigation Company, San Francisco, California, S.S. Californian
Oregon State University, Department of Oceanography, Corvallis, Oregon R/V Yaquina
Pacific Missile Range, Range Operations Department, Geophysics Division, Point Mugu, California
Pacific Oceanographic Group, Nanaimo, British Columbia, by H. J. Hollister from observations by G. C. Wilks at Langara Island Light; W. K. Richardson at Cape St. James Light; Lily Collins at Quatsino Lightstation; O. A. Edwards at Amphitrite Point Light
Scripps Institution of Oceanography, La Jolla, California, by Margaret Robinson and Hans Klein
W. R. Grace and Company, New York, by Dr. I. William Lane
Ships Martinac

Charts

Figure 1.--Mean sea surface temperatures (°F) derived from approximately 9000 observations. Squares show temperatures at weather ship stations. Numerals on shore are temperatures at coastal and lightship stations.

Figure 2.--Deviation of sea surface temperatures (°F) from long term charts of H.O. 225. Hatched areas are colder in 1968.

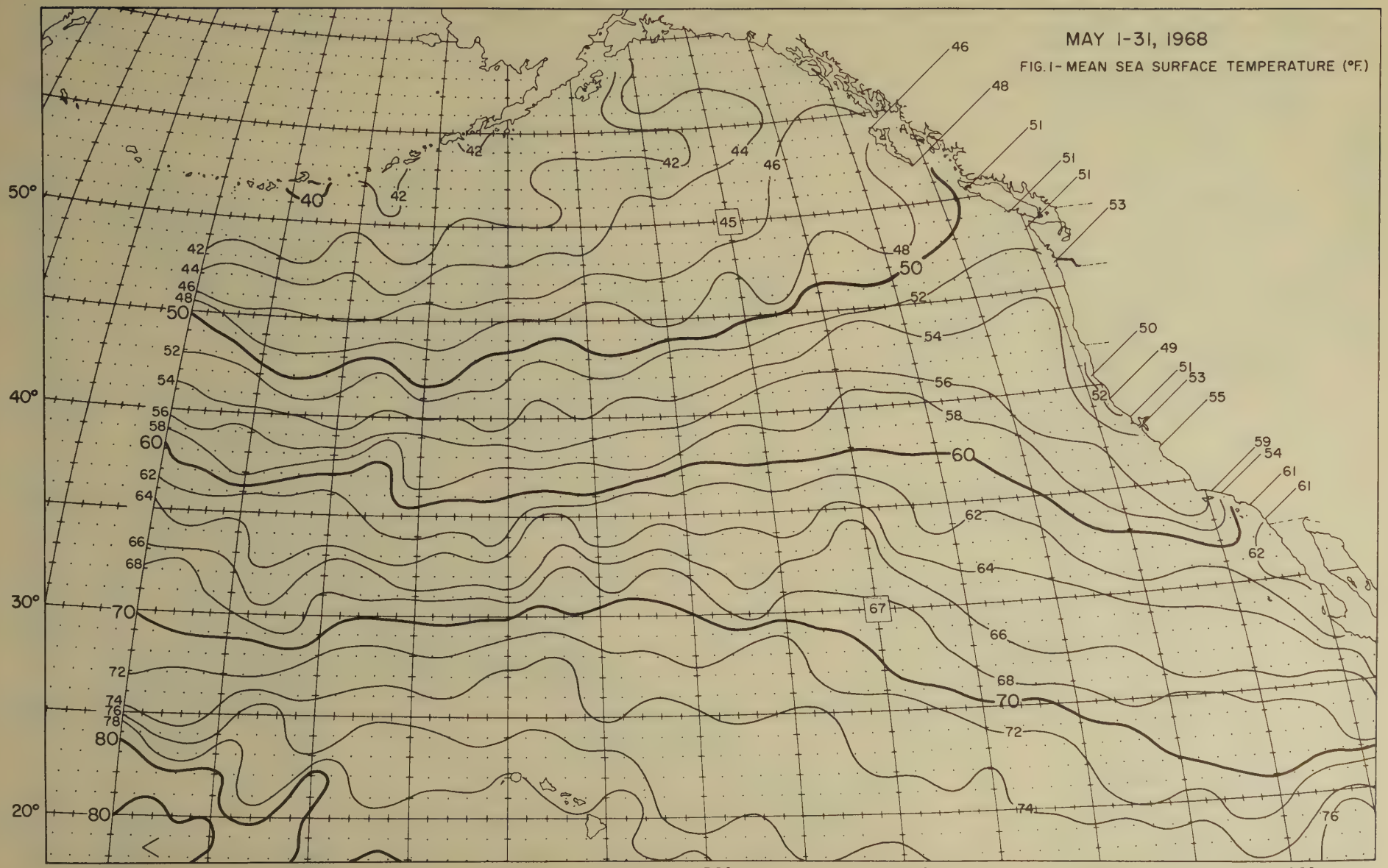
Figure 3.--Deviation of sea surface temperatures (°F) from those of May 1967. Hatched areas are colder in 1968.

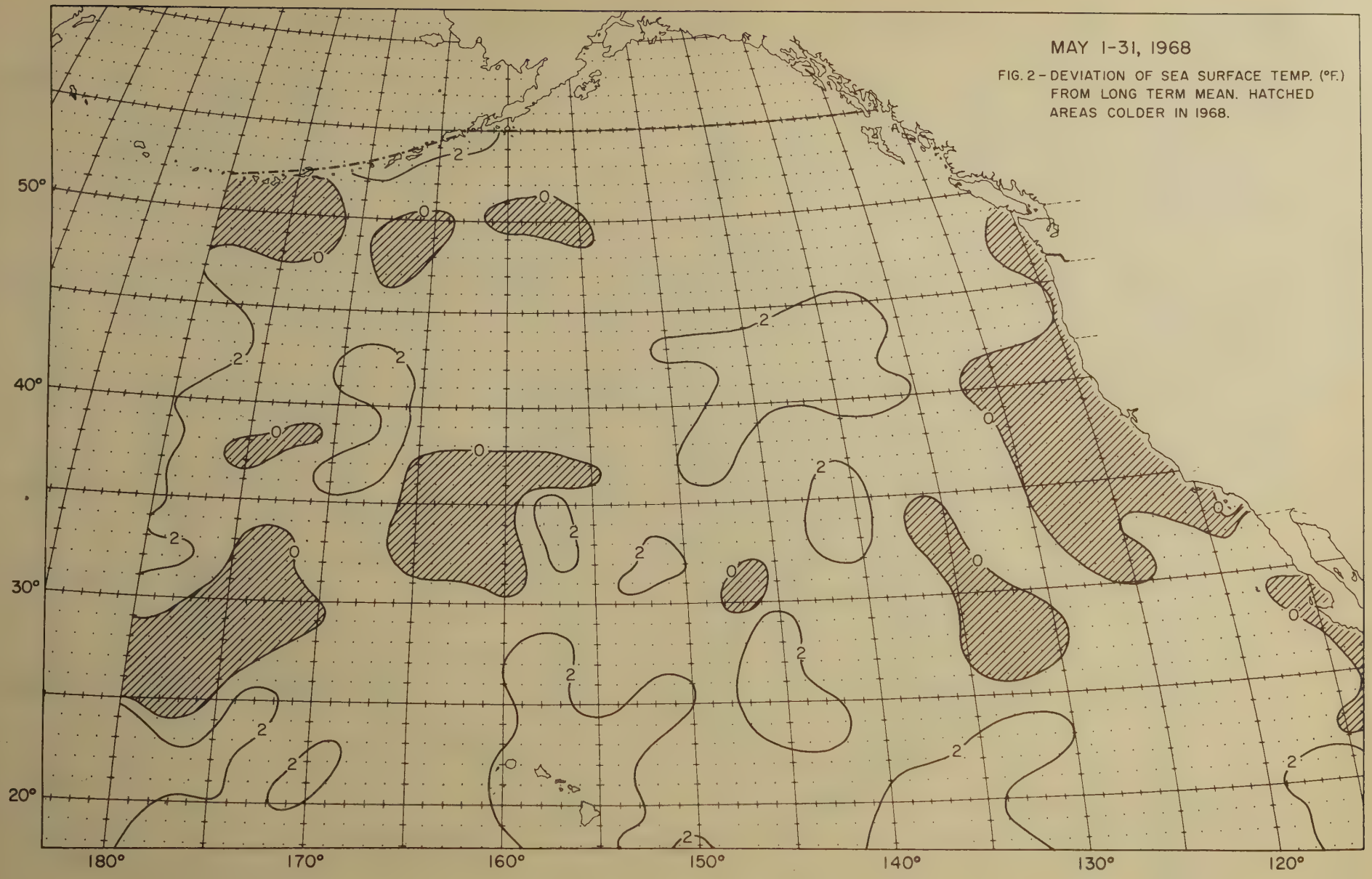
Figure 4.--Sea surface temperatures (°F) by 1-degree squares, approximately 3000 observations. Line under temperatures indicates average of two or more observations. Numerals on shore are temperatures at coastal stations.

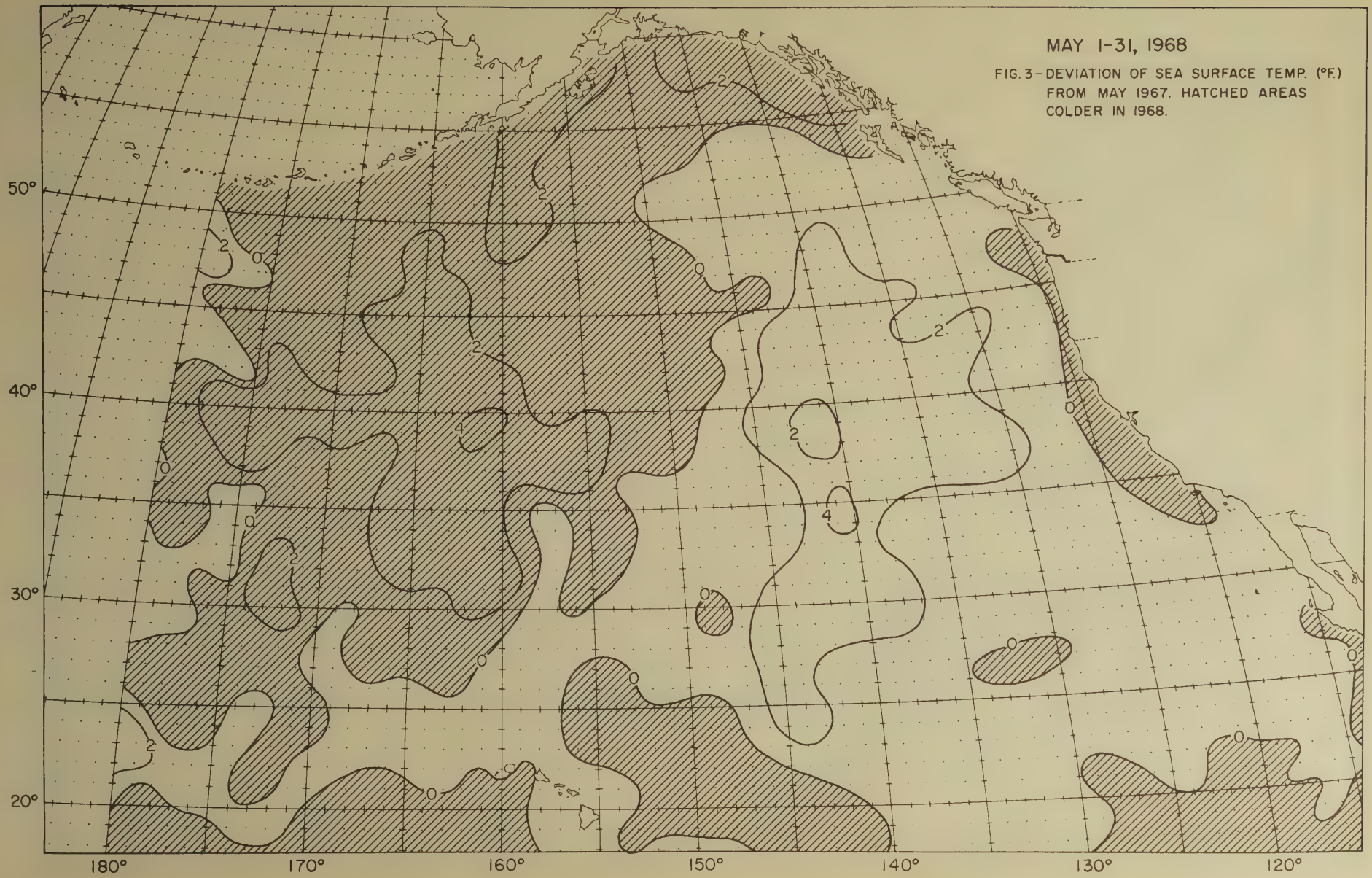
Figure 5.--Deviation of sea surface temperatures (°F) May 1968-May 1967 by 1-degree squares. Shaded areas are colder in 1968.

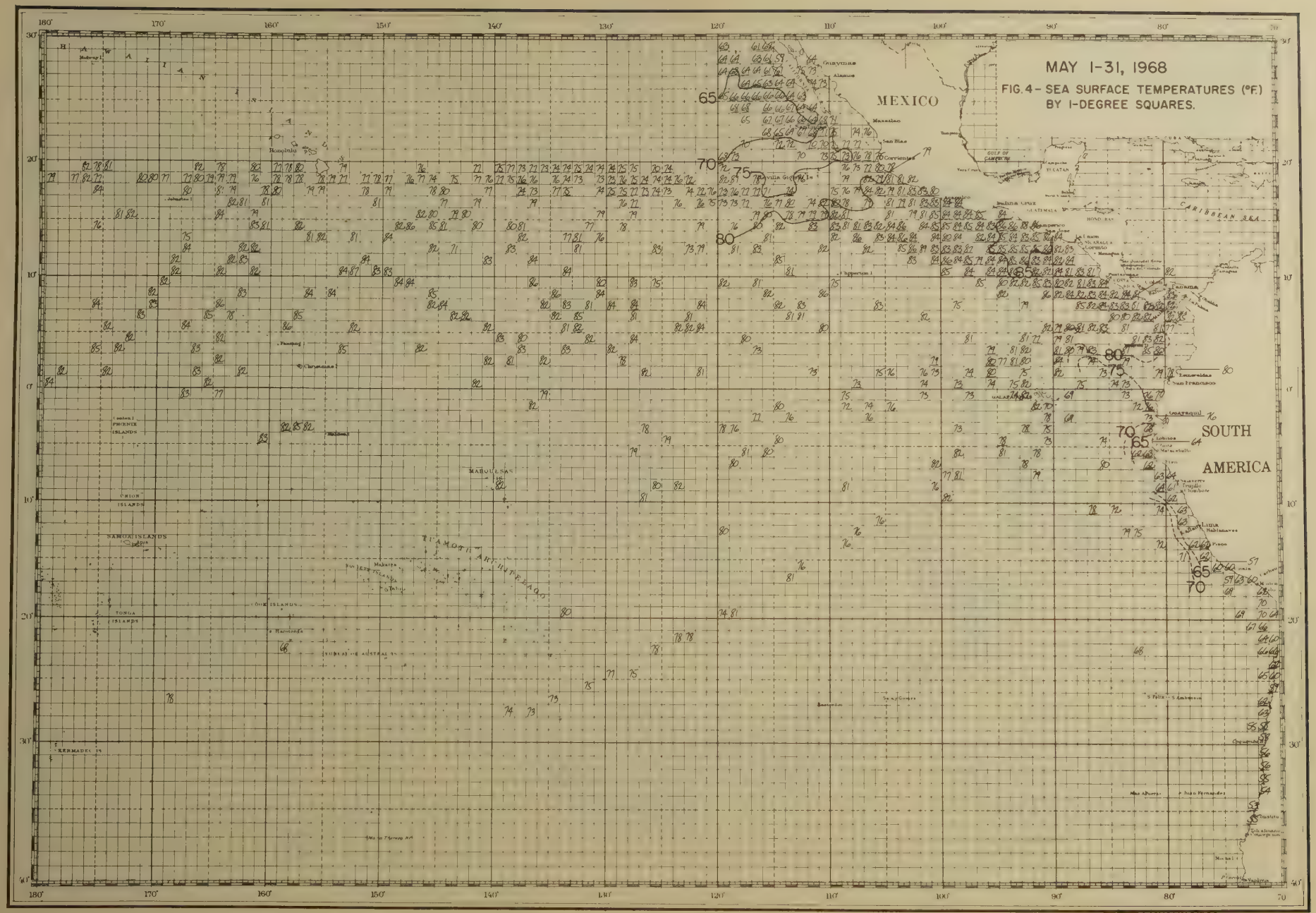
Figure 6.--Deviation of sea surface temperatures (°F) from 12-year mean (1947-1958) by 2-degree squares. Shaded areas are colder in 1968.

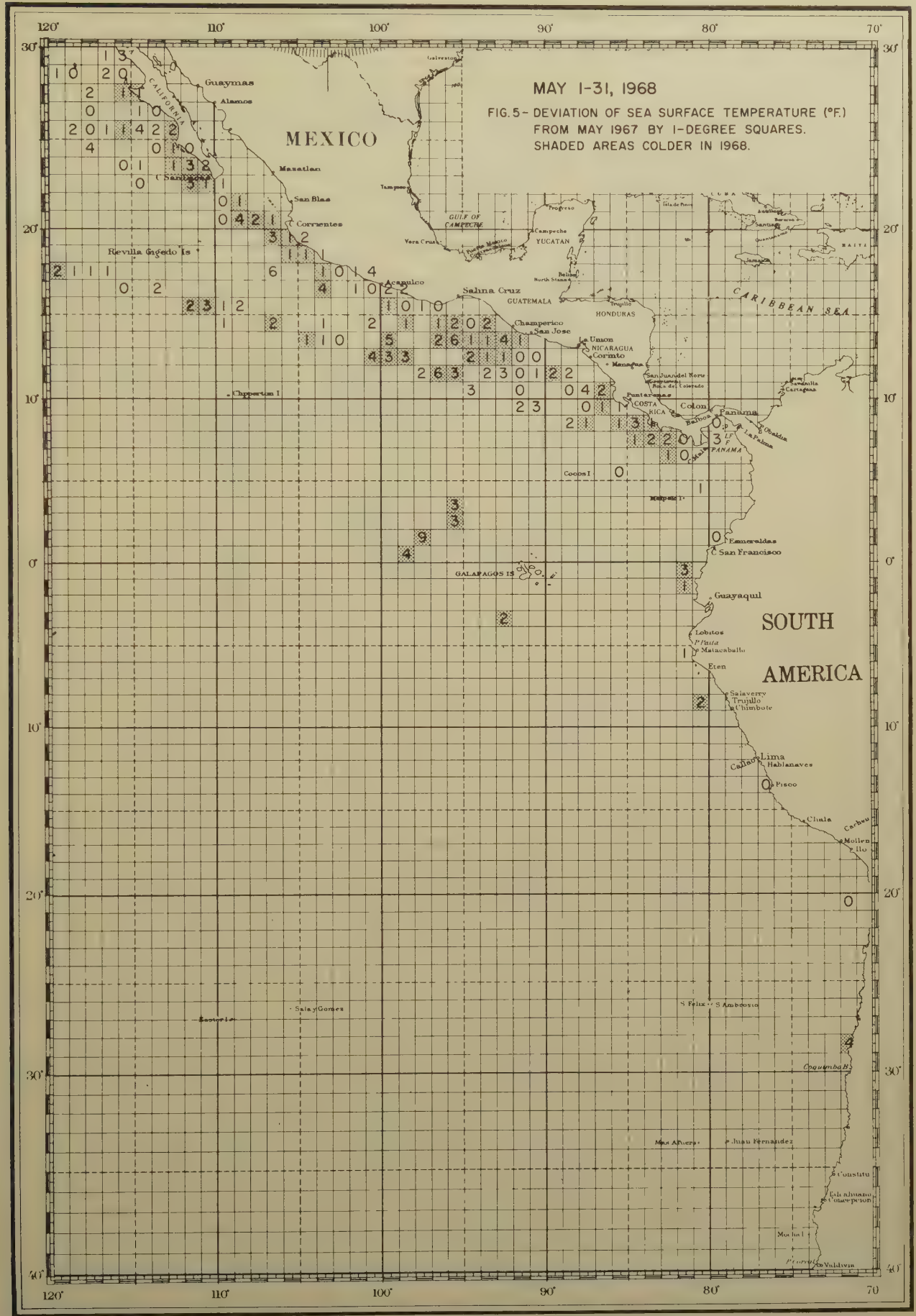
James A. Renner, Fishery Biologist (General)
Kenneth S. Raymond, Scientific Illustrator
June 13, 1968


MAY 1-31, 1968
FIG. 1- MEAN SEA SURFACE TEMPERATURE (°F.)
50°
40°
30°
20°
180°
170°
160°
150°
140°
130°
120°
45
67


MAY 1-31, 1968
FIG. 2 - DEVIATION OF SEA SURFACE TEMP. (°F.) FROM LONG TERM MEAN. HATCHED AREAS COLDER IN 1968.
50°
40°
30°
20°
180°
170°
160°
150°
140°
130°
120°


MAY 1-31, 1968
FIG. 3 - DEVIATION OF SEA SURFACE TEMP. (°F.) FROM MAY 1967. HATCHED AREAS COLDER IN 1968.
50°
40°
30°
20°
180°
170°
160°
150°
140°
130°
120°


MAY 1-31, 1968
FIG. 4 - SEA SURFACE TEMPERATURES (°F.)
BY 1-DEGREE SQUARES.
MEXICO
SOUTH
AMERICA
CARIBBEAN SEA
HAWAIIAN ISLANDS
Honolulu
PHOENIX ISLANDS
SAMOA ISLANDS
TONGA ISLANDS
UNION ISLANDS
MARQUESAS
TUAMOTU ARCHIPELAGO
Tahiti
KERMADEC IS.
Guayaquil
Lima
San Francisco
Acapulco
Panama
180°
170°
160°
150°
140°
130°
120°
110°
100°
90°
80°
70°
30°
20°
10°
0°
40°


MAY 1-31, 1968
FIG. 5- DEVIATION OF SEA SURFACE TEMPERATURE (°F.) FROM MAY 1967 BY 1-DEGREE SQUARES. SHADED AREAS COLDER IN 1968.
MEXICO
CALIFORNIA
GULF OF CAMPECHE
YUCATAN
CARIBBEAN SEA
GUATEMALA
HONDURAS
NICARAGUA
COSTA RICA
PANAMA
GALAPAGOS IS
SOUTH AMERICA
Guaymas
Alamos
Mazatlan
San Blas
Corrientes
Revilla Gigedo Is
Acapulco
Salina Cruz
Champerico
San Jose
La Union
Cormto
Managua
Chippetum I
Cocos I
Esmeraldas
San Francisco
Guayaquil
Lobitos
Talara
Matacaballo
Eten
Salaverry
Trujillo
Chimbote
Callao
Lima
Hablanaves
Pisco
Chala
Carbon
Mollendo
Ilo
Sala y Gomez
S Felix
S Ambrosio
Juan Fernandez
Mas Afuera
Constitucion
Concepcion
Mocha I
Valdivia
Galveston
Tampico
Vera Cruz
Progreso
Campeche
Belize
North Stann Ck
Isla de Pinos
Santiago
Guantanamo
Barracoa
CUBA
HAITI
Jamaica
Trujillo
Santa Marta
Cartagena
Sandy Ilds
San Juan del Norte
Mouth of Colorado
Punta Arenas
Bocas
Colon
Panama
Obaldia
La Palma
Pta Mala
Pta Parita
Malpelo I
Chipchipe
Puerto Pizarro
Isla Lobos de Afuera
Isla Lobos de Tierra
Isla Foca
Isla Macabi
Isla Santa Maria
Isla Mocha
Isla Guafo
Isla Huafo
Isla Chiloe
Isla Talcan
Isla Guamblin
Isla Wellington
Isla Duque de York
Isla Hanover
Isla Pitt
Isla Byron
Isla Evout
Isla Clarence
Isla Desolacion
Isla Hoste
Isla Navarino
Isla Gordon
Isla Lennox
Isla Picton
Isla Nueva
Isla Barnevelt
Isla Grafton
Isla Wollaston
Isla Hermite
Isla Deceit
Isla Duncan
Isla Santa Ines
Isla Carlos III
Isla Dawson
Isla Clarence
Isla Desolacion
Isla Hoste
Isla Navarino
Isla Gordon
Isla Lennox
Isla Picton
Isla Nueva
Isla Barnevelt
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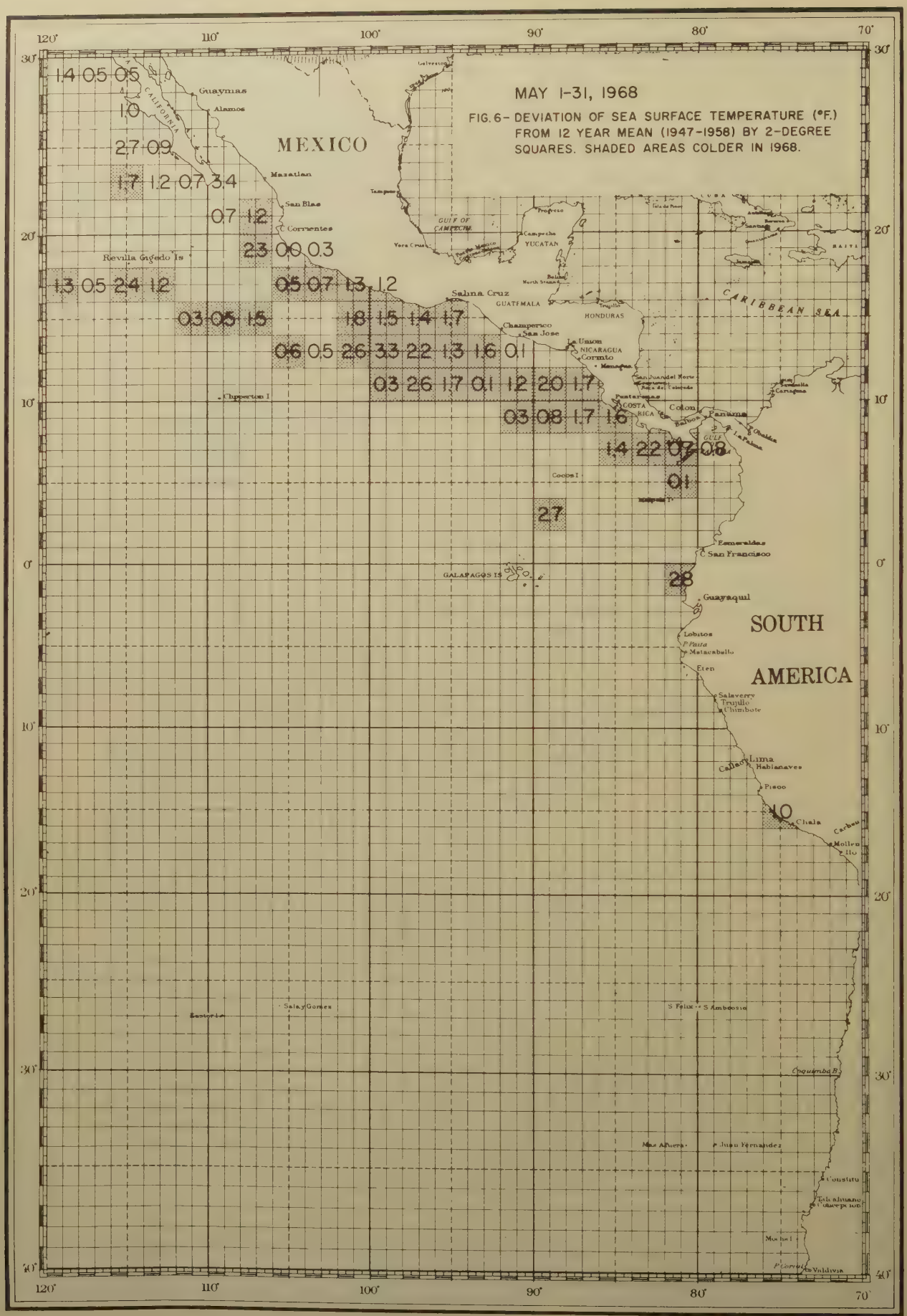
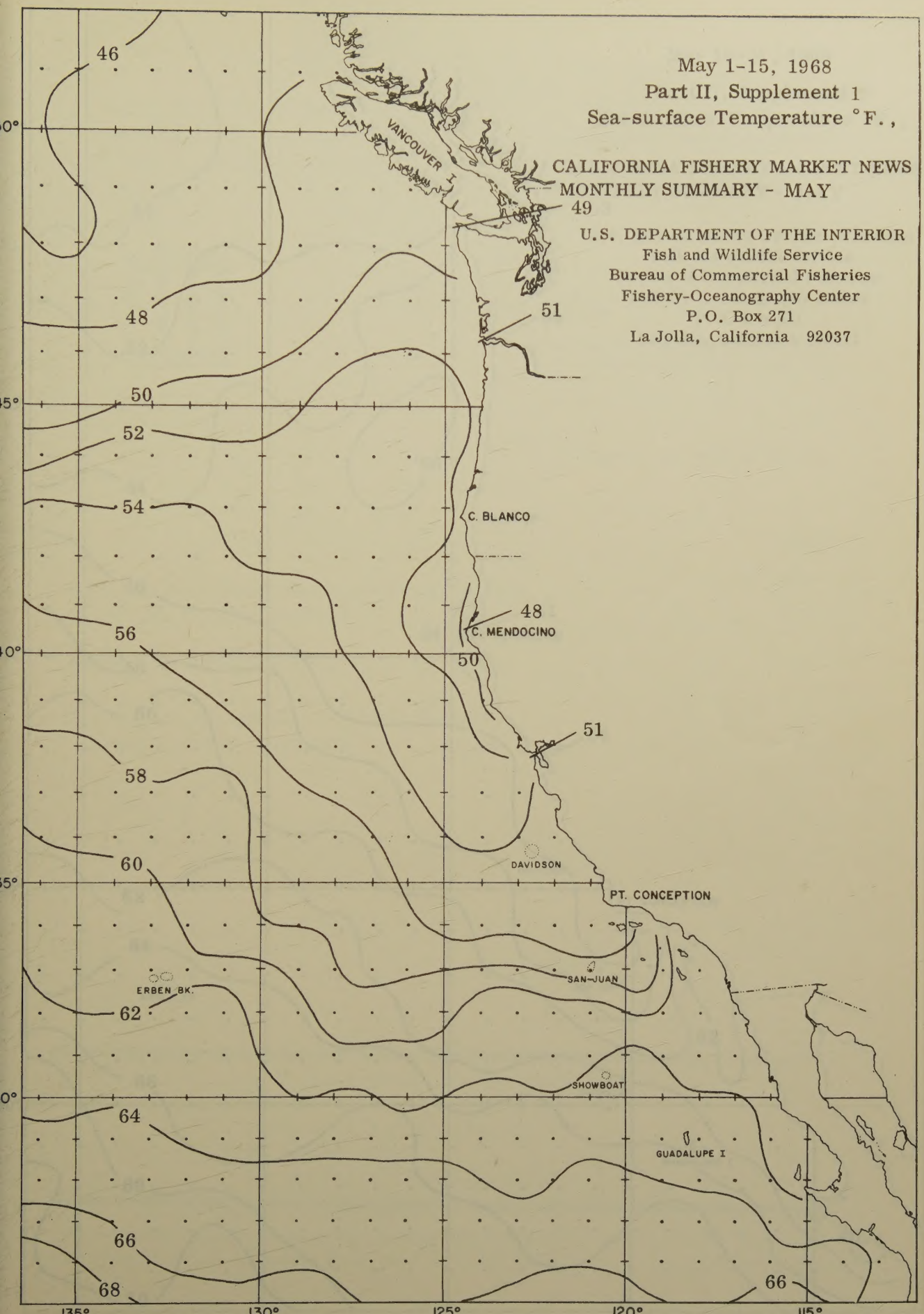
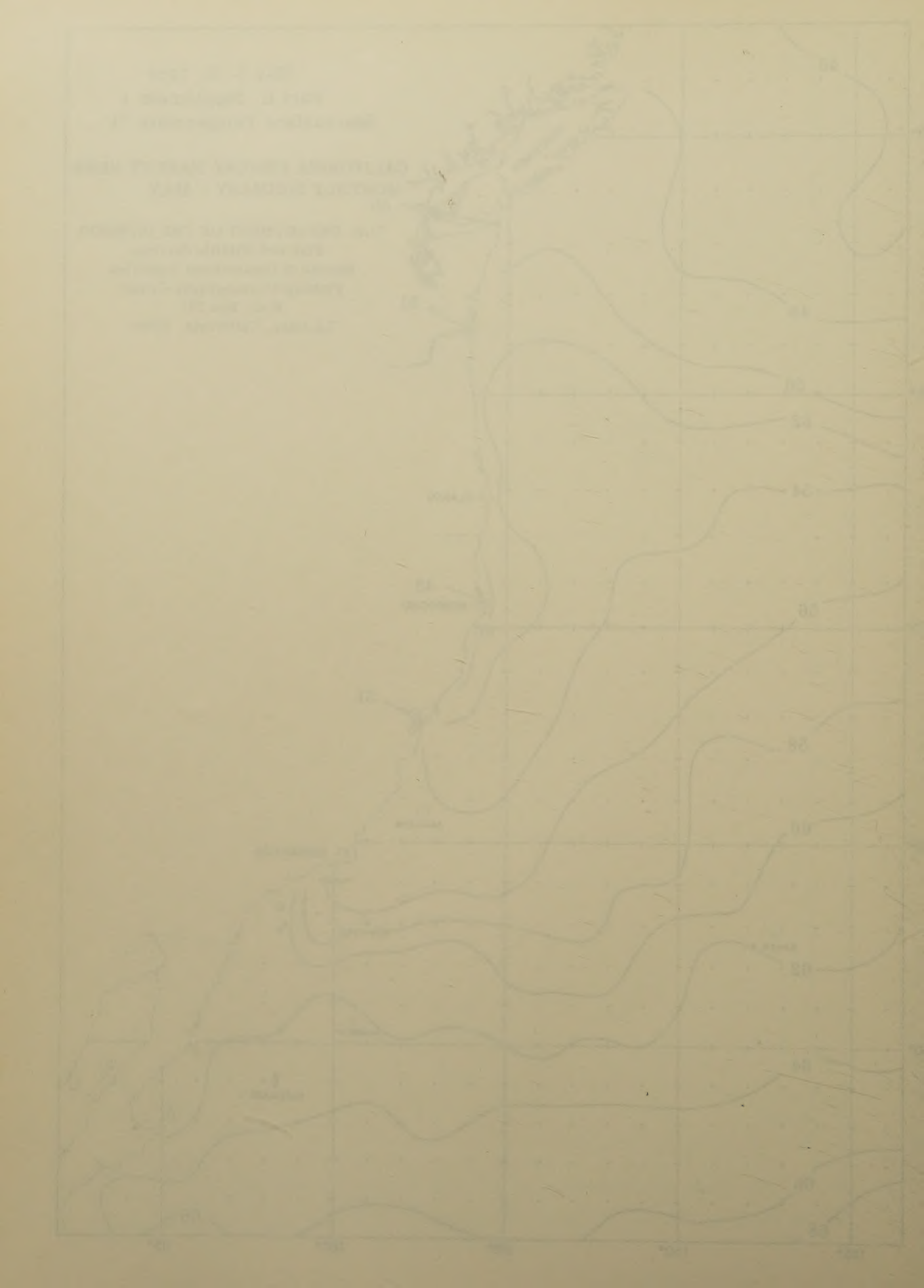
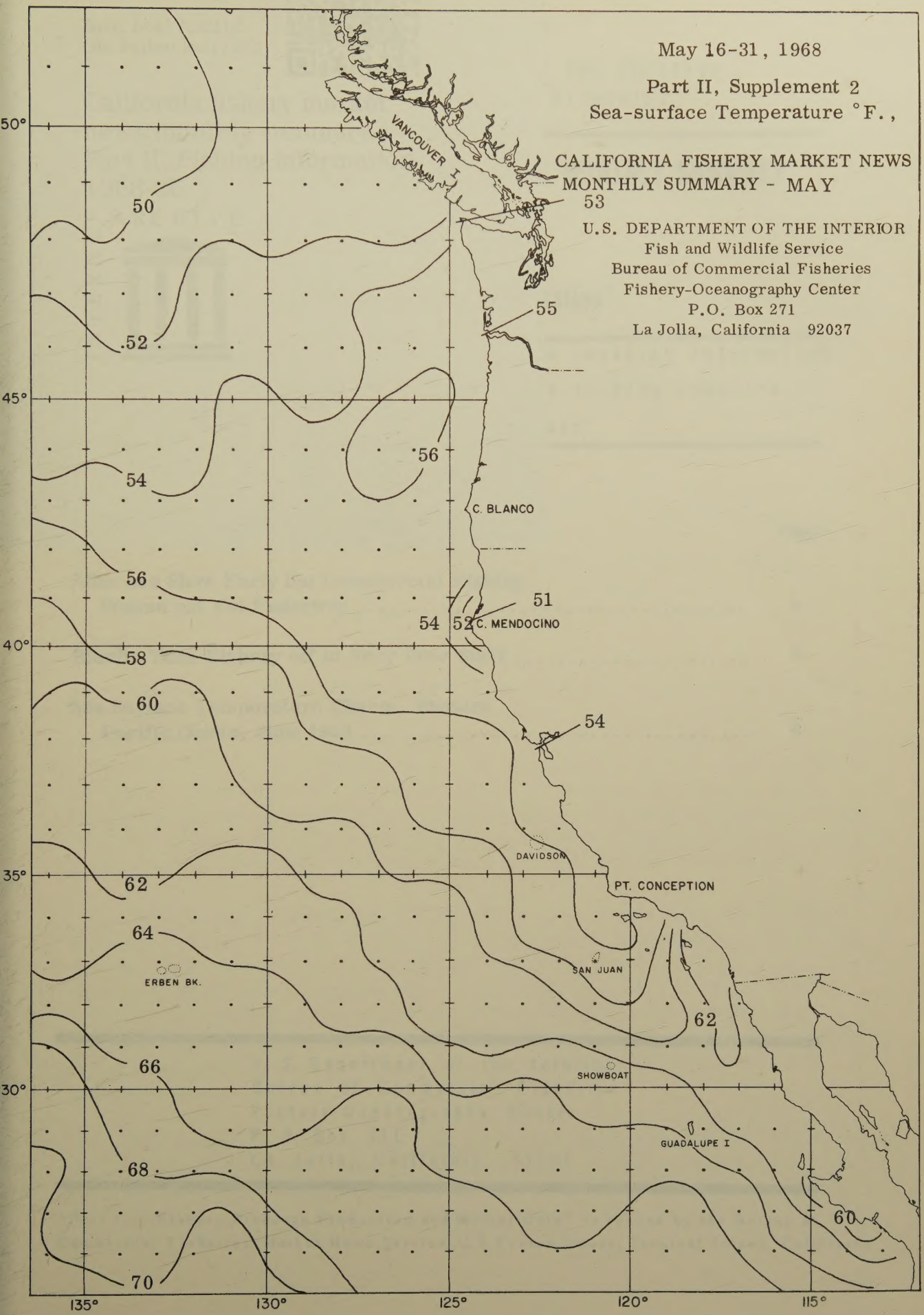
Isla Wollaston
Isla Hermite
Isla Deceit
Isla Duncan
Isla Santa Ines
Isla Carlos III
Isla Dawson


MAY 1-31, 1968
FIG. 6- DEVIATION OF SEA SURFACE TEMPERATURE (°F.) FROM 12 YEAR MEAN (1947-1958) BY 2-DEGREE SQUARES. SHADED AREAS COLDER IN 1968.
MEXICO
SOUTH AMERICA
CARIBBEAN SEA
GULF OF CALIFORNIA
GUATEMALA
HONDURAS
NICARAGUA
COSTA RICA
YUCATAN
GALAPAGOS IS
Guaymas
Alamos
Mazatlan
San Blas
Corrientes
Salina Cruz
Champerico
San Jose
Corinto
Panama
Colon
Esmeraldas
San Francisco
Guayaquil
Lobitos
Talara
Salaverry
Trujillo
Chimbote
Lima
Callao
Pisco
Chala
Mollendo
Arica
Iquique
Antofagasta
Coquimbo
Valparaiso
Valdivia
Juan Fernandez
Easter I
Clipperton I
Revilla Gigedo Is
Cocos I
1.4 0.5 0.5
1.0
2.7 0.9
1.7 1.2 0.7 3.4
0.7 1.2
2.3 0.0 0.3
1.3 0.5 2.4 1.2
0.5 0.7 1.3 1.2
0.3 0.5 1.5
1.8 1.5 1.4 1.7
0.6 0.5 2.6 3.3 2.2 1.3 1.6 0.1
0.3 2.6 1.7 0.1 1.2 2.0 1.7
0.3 0.8 1.7 1.6
1.4 2.2 0.7 0.8
0.1
2.7
2.8
1.0


May 1-15, 1968
Part II, Supplement 1
Sea-surface Temperature °F.,
CALIFORNIA FISHERY MARKET NEWS
MONTHLY SUMMARY - MAY
U.S. DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Bureau of Commercial Fisheries
Fishery-Oceanography Center
P.O. Box 271
La Jolla, California 92037
VANCOUVER I
46
48
49
50
51
52
54
56
58
60
62
64
66
68
C. BLANCO
C. MENDOCINO
DAVIDSON
PT. CONCEPTION
SAN-JUAN
SHOWBOAT
GUADALUPE I
ERBEN BK.
135°
130°
125°
120°
115°




May 16-31, 1968
Part II, Supplement 2
Sea-surface Temperature °F.,
CALIFORNIA FISHERY MARKET NEWS
MONTHLY SUMMARY - MAY
U.S. DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Bureau of Commercial Fisheries
Fishery-Oceanography Center
P.O. Box 271
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VANCOUVER I.
C. BLANCO
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PT. CONCEPTION
SAN JUAN
SHOWBOAT
GUADALUPE I
ERBEN BK.
50°
45°
40°
35°
30°
135°
130°
125°
120°
115°
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